

On the Alloys of Steel. By J. Stodart, Esq. F.R.S. and Mr. M. Faraday, Chemical Assistant in the Royal Institution. Communicated by J. Stodart, Esq. F.R.S. Read March 21, 1822. [*Phil. Trans.* 1822, p. 253.]

The metals which form the most valuable alloys with steel, for the purpose of manufacture into cutting instruments, are silver, platinum, rhodium, iridium, osmium, and palladium. Eight pounds of Indian steel, alloyed with $\frac{1}{100}$ th of pure silver, formed a very hard and tenacious compound, well adapted to the manufacture of cutlery and several edge tools. Ten pounds of the same steel with $\frac{1}{100}$ th of pure platinum, produced an alloy less hard but more tough than the former.

With rhodium, iridium, and osmium the alloys were also excellent; but the scarcity of those metals prevents their general introduction into the manufactory.

The authors then state the processes of analysis which they adopted to assure themselves of the composition and perfection of the respective alloys.

The alloy with platinum is rapidly acted upon by sulphuric acid; and to ascertain the presence of the platinum, the residuary black powder of this solution, after having been heated red hot, is to be treated with nitro-muriatic acid, and the platinum reduced by heat.

The residuary matter of the alloy of silver, when similarly acted on by dilute sulphuric acid, was dissolved in nitric acid, and tested by muriatic. The residue of the alloy of palladium having been heated, was dissolved in nitro-muriatic acid, and precipitated by prussiate of mercury. From the rhodium residuum the iron was removed by muriatic acid, and long digestion in nitro-muriatic acid gave an easily distinguishable muriate of rhodium. The residue of iridium and osmium was decomposed in the usual way by the action of caustic soda.

The rapid action of dilute sulphuric acid upon these alloys, as compared with pure steel, is next adverted to, and is referred to electrical action, a voltaic combination being produced by the liberation of the difficultly oxidable metal.

The black insoluble residue of these alloys, obtained by the action of dilute sulphuric, appear to be peculiar compounds. When boiled in dilute muriatic acid, protoxide of iron is dissolved, and a black insoluble compound remains, which, when dried and heated to 400° , burns like pyrophorus, leaving protoxide of iron and the alloying metal: hence, say the authors, during the action of the acids on the steel, a portion of hydrogen enters into combination with part of the metal and charcoal, and forms an inflammable compound not acted on by the acids. The action of nitric acid on some of these residua produces a deflagrating compound, especially that from the alloy of platinum.

This paper concludes with some observations on the probable im-

portance of some triple alloys, and on the substitution of pure iron for steel in the formation of alloys.

Some Observations on the Buffy Coat of the Blood, &c. By John Davy, M.D. F.R.S. Read April 18, 1822. [*Phil. Trans.* 1822, p. 271.]

The peculiar appearance which the blood sometimes assumes after its coagulation, and which has been termed "buff," has been referred by Mr. Hewson to its increased tenuity and slow coagulation. Dr. Davy is inclined to ascribe the separation of the colouring matter from a part of the coagulum, or diminished viscosity to the former rather than the latter cause; for he has remarked that blood drawn in several inflammatory diseases coagulates with its usual rapidity, and yet forms the buffy coat: its specific gravity also rather exceeds than falls short of that of healthy blood.

Dr. Davy next adverts to the opinion that the age of the morbid adhesions, which on dissection are often found to connect together serous membranes, is proportionate to their strength: but as he has found strong adhesions formed in twenty-four hours between surfaces of the pleura, in consequence of inflammation artificially excited; and as he has remarked a peculiar tenacity in the coagulable lymph of the blood, enabling it to be drawn out into bands and fibres, which become solid and opaque, and thus represent ordinary adhesions, he is inclined to doubt the correctness of the above opinion.

Lastly, the author mentions the supposed pouring out of serous fluids into certain cavities, after death; and cites experiments to show that, under ordinary circumstances, no such effusion or exudation of serum takes place.

On the Mechanism of the Spine. By Henry Earle, Esq. F.R.S. Surgeon to the Foundling, and Assistant Surgeon to St. Bartholomew's Hospital. Read April 25, 1822. [*Phil. Trans.* 1822, p. 276.]

In examining the structure of the vertebræ in different animals, the author was particularly struck with the mechanism of the spine and spinal canal in birds, by which great motion is gained in the neck without injury to the spinal marrow. The cervical vertebræ in birds vary from 9 to 24 in number; they differ considerably from each other, and are articulated by complex joints, in some respects resembling the articulation of the olecranon with the humerus in the human subject, but admitting also of lateral motion. The varying positions of the articulating surfaces are favoured by the interposition of a cartilage, adapted to the surface of each bone, and inclosed between reduplications of sinovial membrane; each joint is thus double, and resembles the articulation of the human lower jaw. The canal of each vertebra is contracted in the centre, and enlarges above and